CONTROLLED POWER COMPANY

TROY, MICHIGAN

# MODEL LTN

## OWNERS MANUAL


## 700VA - 2.1KVA

### UNINTERRUPTIBLE POWER SUPPLY

IMPORTANT - SAVE THESE INSTRUCTIONS - PLEASE READ THIS MANUAL
BEFORE USING EQUIPMENT

110156 - Rev 20

Caution

The following symbol indicates that caution should be taken when performing the process required in this manual. Damage to the unit or personal harm could happen if proper precautions are not taken.

Shock Hazard

The following symbol indicates that there is a risk of electrical shock if proper precautions are not followed. Only qualified personnel should perform the actions required in this manual.

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**ABOUT THIS MANUAL**

When viewing electronically, click on the subject to jump to that page.
Clicking the header on the front page will launch the Controlled Power web site.
Clicking anywhere else on the front page will also jump to the Table of Contents.
Clicking any blue text will take you to that section of our website.

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## INTRODUCTION

Controlled Power Company engineers and manufactures the industry's highest quality power conditioning and UPS equipment, capitalizing on 4 decades of expertise. We have an enviable reputation for quality, which is reflected in the design, workmanship, and performance of our products.

We provide the widest range of power equipment for regulating, conditioning, isolating, purifying, and distributing incoming electrical power. All products incorporate state-of-the-art technology, optimizing performance characteristics for various applications. Our products protect sensitive electronic systems from erratic operation and failure due to power line transients, noise, brownouts, sags, surges, and total power outages.

## FUNCTION

The overall function of the LTN Series UPS's is to take polluted, fluctuating, and erratic electrical power that exists in all areas today and purify or replace it (in the case of complete power outages) with well-regulated, computer grade power.

Especially valuable for I.T. and computer networking applications, as well as individual work-stations, the LTN UPS's maintain electrical power to the critical load for approximately 10 minutes to several hours. The backup time is a function of the amount of battery reserve that is purchased with the system.

## FEATURES & BENEFITS

The LTN Series products are designed to maximize backup time, protect your computer or critical load, and monitor all the key parameters of electrical power including a log of events.

Features include:

- Steady, Regulated Voltage to ±3% of Nominal, Extends the Life of Your Equipment
- Highest Level Performance Sine Wave Output Matches Your System's Requirements
- 100% Power Conditioning
- No-break, Continuous Power Provides Seamless Switching to Battery Backup
- Integral Status and Alarm Panel
- Remote Communications Via Alarm Signals or RS232
- Patented "Fuzzy Ranging"™ Control Extends Battery Life and Backup Time
- Optional Extended Backup Time
- Optional NetMinder UPS Communications Software and Hardware for UPS Monitoring and Network Management

| BENEFITS OF OWNING AND USING THE LTN SERIES UPS | |
|---|---|
| | |
| • Environmental Adaptive Control | • Priced to be Affordable |
| • True On-Line Protection | • 200,000 Hour MTBF Transformer |
| • Power Factor Correction | • Extremely High Surge Capability |
| • Line Harmonic Filtering | • 3:1 Crest Factor for Non Linear Loads |
| • Small Physical Size | • Simple Operation |
| • Simple and Inexpensive Installation | • Full RS232 Communication of Operating Parameters |
| • Quiet Operation | • Input and Output Circuit Breakers |
| • Low BTU Output | • Nation Wide Customer Support Service |
| • Microprocessor Control and Diagnostics | • Automatic Synchronized Retransfer |
| • UL1778 | |

## *LTN TOTAL POWER SECURITY*

**Built-In Isolation**

It is a common fact that isolation transformers provide electrical security for the load, eliminate electrical noise, and produce a new clean ground for digital and communication signals. All LT, LTR, and LTN products include a power purifying isolation transformer (uncommonly found in 700VA to 2.1KVA UPS's), which protects your equipment from the most damaging power disturbances. This standard isolation transformer offers the user a choice of input and output voltage selections between 120 to 240 volts.

**Input Power Factor Correction With Less Than 10% Total Harmonic Distortion (THD) -** Double magnetic conversion prevents damaging load-generated harmonics from backing-up into the utility lines.

**Fuzzy Ranging™ -** Fuzzy Ranging™, a patented technology solution, uses fuzzy logic to automatically broaden the input operating range as a function of load. This feature provides added security during deep brownout conditions without battery consumption. Fuzzy Ranging assures the batteries will be at full capacity for a real emergency…a power outage.

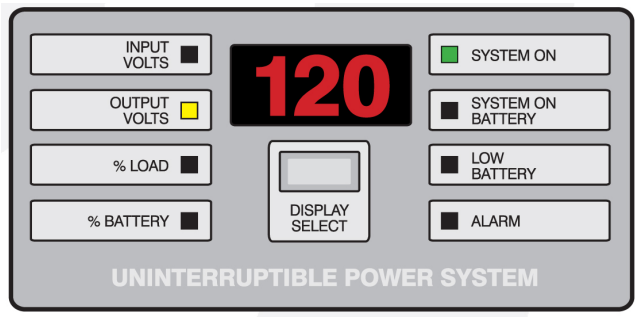
## *Display Monitors & Diagnostics*

Bright, 3-Digit LED Provides System Parameters:

- Input Voltage
- Output Voltage
- Percent of Battery Capacity
- Percent of Load
- Percent of Battery Charged

LED Indicators Provide System Status:

- System On (Green)
- System On Battery (Yellow)
- Low Battery Warning (Red)
- General Alarm




## *Product Specifications:*

***Input***
**Voltage:** 120, 208, or 240 VAC at 60 Hz
**Operating Range:** +10%, -40% typical
**Frequency Range:** ±2.5 Hz

***Performance***
**Common Mode:** 120 dB
Transverse Mode: 70 dB
Fuzzy Ranging Plus™: Human-like decision making to optimize usable input line voltage without using batteries. Range without battery consumption to 60% of nominal input voltage.

***Output***
**Sine Wave Voltage:** Maximum 3% harmonic distortion, any single harmonic 120 VAC; 120/208 VAC; 120/240 VAC at 60 Hz (Consult factory for 50 Hz voltage options.)
**Load Regulation:** Typically better than ±3%
**Isolation:** Galvanic isolation

***Environmental Operating Temperature:*** 0°C – 40°C

***Agencies***
- IEEE 587 Category B Guide for surge suppressio
- IEC 555

***MTBF -*** Total System: 100,000 hours

***Safety***
- UL / cUL Listed 1778 Standard for UPS Equipment
- UL Listed 544 Standard for use in healthcare facilities
- FCC Article 15, J, Class A

# *SAFETY PRECAUTIONS*

**IMPORTANT SAFEGUARDS, READ AND FOLLOW ALL SAFETY INSTRUCTIONS.**
**SAVE THESE INSTRUCTIONS.**

******* CAUTION *******

**A BATTERY CAN PRESENT A RISK OF ELECTRICAL SHOCK AND HIGH SHORT CIRCUIT CURRENT. THE FOLLOWING PRECAUTIONS SHOULD BE OBSERVED WHEN WORKING ON BATTERIES:**

- **REMOVE WATCHES, RINGS, OR OTHER METAL OBJECTS.**
- **USE TOOLS WITH INSULATED HANDLES.**
- **WEAR RUBBER GLOVES AND BOOTS.**
- **DO NOT LAY TOOLS OR METAL PARTS ON TOP OF BATTERIES.**
- **DISCONNECT CHARGING SOURCE PRIOR TO CONNECTING OR DISCONNECTING BATTERY TERMINALS.**

******* CAUTION *******

**USE CAUTION WHEN HANDLING OR SERVICING BATTERIES. BATTERY ACID CAN CAUSE BURNS TO SKIN AND EYES. IF ACID IS SPILLED ON SKIN OR IN THE EYES, FLUSH WITH FRESH WATER AND CONTACT A PHYSICIAN IMMEDIATELY.**

**BATTERIES ARE VERY HEAVY. USE CAUTION WHEN LIFTING AND MOVING THEM. INSTALLATION SHOULD ONLY BE PERFORMED BY AUTHORIZED PERSONNEL.**

**DIAGRAMS FOR WIRING BATTERIES ARE SHOWN ON THE FOLLOWING PAGES. BE SURE TO WIRE BATTERIES PROPERLY. IMPROPER WIRING CAN CAUSE DAMAGE TO THE BATTERIES. WIRING SHOULD ONLY BE PERFORMED BY AUTHORIZED PERSONNEL.**

- **FOLLOW ALL STANDARD AND LOCAL ELECTRICAL CODES.**
- **BE SURE INPUT POWER TO UPS IS PROPERLY GROUNDED.**
- **DO NOT ALLOW WATER OR FOREIGN OBJECTS TO GET INSIDE UPS.**
- **DO NOT PLACE OBJECTS OR LIQUIDS ON TOP OF THE UPS.**
- **DO NOT LOCATE UPS NEAR RUNNING WATER OR WHERE THERE IS EXCESSIVE HUMIDITY.**
- **DO NOT USE OUTDOORS.**
- **DO NOT MOUNT NEAR GAS OR ELECTRIC HEATERS.**
- **EQUIPMENT SHOULD BE MOUNTED IN LOCATIONS AND AT HEIGHTS WHERE IT WILL NOT READILY BE SUBJECTED TO TAMPERING BY UNAUTHORIZED PERSONNEL.**
- **THE USE OF ACCESSORY EQUIPMENT NOT RECOMMENDED BY THE MANUFACTURER MAY CAUSE AN UNSAFE CONDITION.**
- **DO NOT USE THIS EQUIPMENT FOR OTHER THAN INTENDED USE.**
- **SERVICING OF BATTERIES SHOULD BE PERFORMED OR SUPERVISED BY PERSONNEL KNOWLEDGEABLE OF BATTERIES AND THE REQUIRED PRECAUTIONS.**
- **KEEP UNAUTHORIZED PERSONNEL AWAY FROM BATTERIES.**
- **DO NOT SHORT BATTERY TERMINALS.**
- **DO NOT DISPOSE OF BATTERY OR BATTERIES IN A FIRE. THE BATTERY MAY EXPLODE.**
- **ONLY REPLACE BATTERIES WITH IDENTICAL SPECIFICATION OF ORIGINAL BATTERIES SUPPLIED WITH THE SYSTEM.**
- **DO NOT OPEN OR MUTILATE THE BATTERY OR BATTERIES. RELEASED ELECTROLYTE IS HARMFUL TO THE SKIN AND EYES. IT MAY BE TOXIC.**
- **READ AND FOLLOW ALL SAFETY INSTRUCTIONS. SAVE THESE INSTRUCTIONS.**

**INSPECTION, PLACEMENT, INSTALLATION, SETUP AND START-UP SHOULD BE PERFORMED BY QUALIFIED PERSONNEL ONLY**

## INSPECTION

Upon receipt of your UPS, visually inspect the unit for shipping damage. If shipping damage has occurred, the purchaser should promptly notify the carrier and file a claim with the carrier. The factory should be notified if the damages may impair the operation of the unit. Reference front cover or accompanying paper work for factory contact information.

Note: Open the front door of the enclosure and inspect inside the unit for shipping damage.

### IMPORTANT NOTICE

This shipment has been carefully inspected, checked and properly packaged at our company.

When it was delivered to the carrier it was in good condition and technically it became your property at that time. Thus, any damage, whether obvious or hidden, must be reported to the transportation company within FIVE days of receipt of the shipment at your premises to avoid forfeiting claims for damages.

### FOR ALL SHIPMENTS DAMAGED IN TRANSIT

Leave the items, packing material and carton “AS IS”. Notify your carrier’s local office and ask for immediate inspection of the carton and contents.

After inspection has been made by the carrier, and you have received acknowledgment in writing as to the damage, notify our Customer Service Department to make any required repair arrangements.

It is your responsibility to follow the above instructions or the carrier will not honor any claims for damage. Also, if there are any shortages or questions regarding this shipment, please notify us within FIVE days.

Please note that we cannot be responsible for any service work or back-charges unless authorized by us in writing, before the work is performed.

## STORAGE

**WHILE IN STORAGE BATTERIES MUST BE CHARGED FOR 24 HOURS EVERY 6 MONTHS. WHILE IN STORAGE DISCONNECT THE BATTERY CONNECTOR FROM THE INVERTER.**

If it is necessary to store the unit, be sure to place it in a clean dry area. **For extended storage, the batteries must be charged for 24 hours every 6 months. Failure to do so will result in weak or bad batteries which WILL NOT be covered under the warranty.** Charging is accomplished by installing the batteries, turning the Inverter on and allowing it to run. See *“Battery Installation”* and *“Battery Wiring”* for details on installing batteries and *“Set Up and Start Up Procedures”* for turning the inverter on. **While storing, disconnect the battery connector from the inverter.** Make sure proper ventilation is available any time the inverter is on.

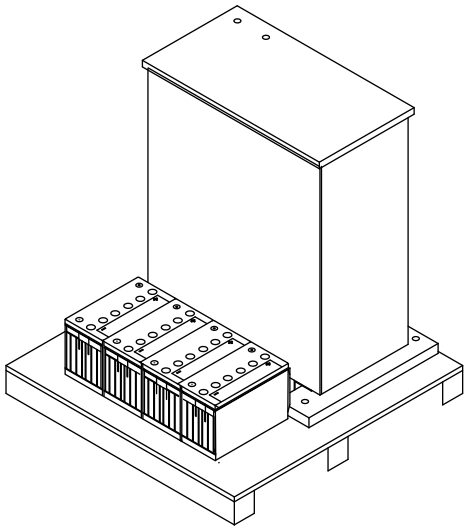
## REMOVING THE UPS FROM THE PALLET

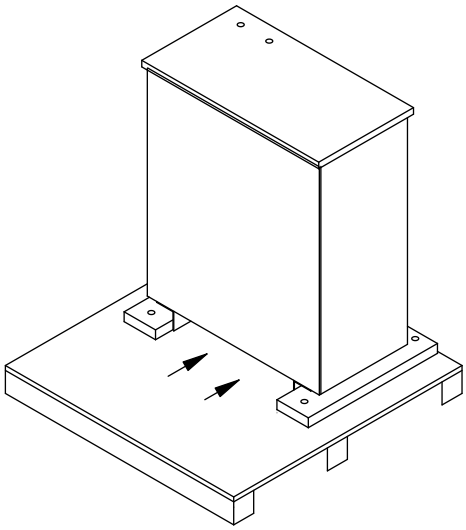
*****CAUTION*****
**CABINETS AND BATTERIES ARE EXTREMELY HEAVY**
**USE PROPER EQUIPMENT WHEN REMOVING**
**THE CABINETS FROM THE SKID**

**TOOLS REQUIRED**:
1/2” Socket, Forklift, dolly, utility knife.

**Batteries on same pallet as UPS**

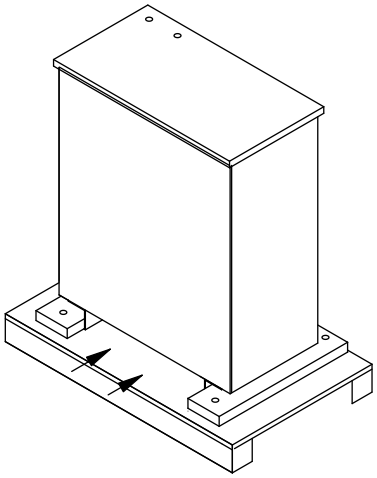
1. Using a utility knife, cut plastic wrapping and banding remove and discard.
2. Remove batteries from pallet with the use of a dolly or other lifting device be sure to place them in a safe location.
3. To remove the UPS from the pallet, first remove the four 1/2” bolts that are securing the UPS cabinet to the pallet.
4. Using a forklift, place the forks securely under the UPS from the front or back side.
5. Carefully lift the UPS from the skid.
6. Set the UPS cabinet down until you are ready for installation.





**Batteries on different pallet as the UPS or batteries installed internally**

1. Remove any plastic wrapping from the UPS.
2. To remove the UPS from the pallet, first remove the four 1/2” bolts that are securing the UPS cabinet to the pallet.
3. Using a forklift, place the forks securely under the UPS from the front or back side.
4. Carefully lift the UPS from the skid.
5. Set the UPS cabinet down until you are ready for installation.



## TOOLS REQUIRED AND INSTALLATION CHECKLIST

_____ Flat Head Screw Driver

_____ The AC input breaker, wiring and amperage matrix defines the proper AC breaker size for the appropriate KVA. Refer only to the matrix for the service panel AC breaker size. The unit comes standard with terminals for hard wire installation.

_____ UPS systems require a ground wire. The ground wire should be the same size as the input feed wires. The ground that feeds the UPS should be of good integrity and dedicated to the UPS. The run should be as short as possible. Conduit cannot be used for the grounding of the circuit.

_____ When wiring batteries be sure to use insulated tools for safety.

### Reference: NEC ARTICLE 250

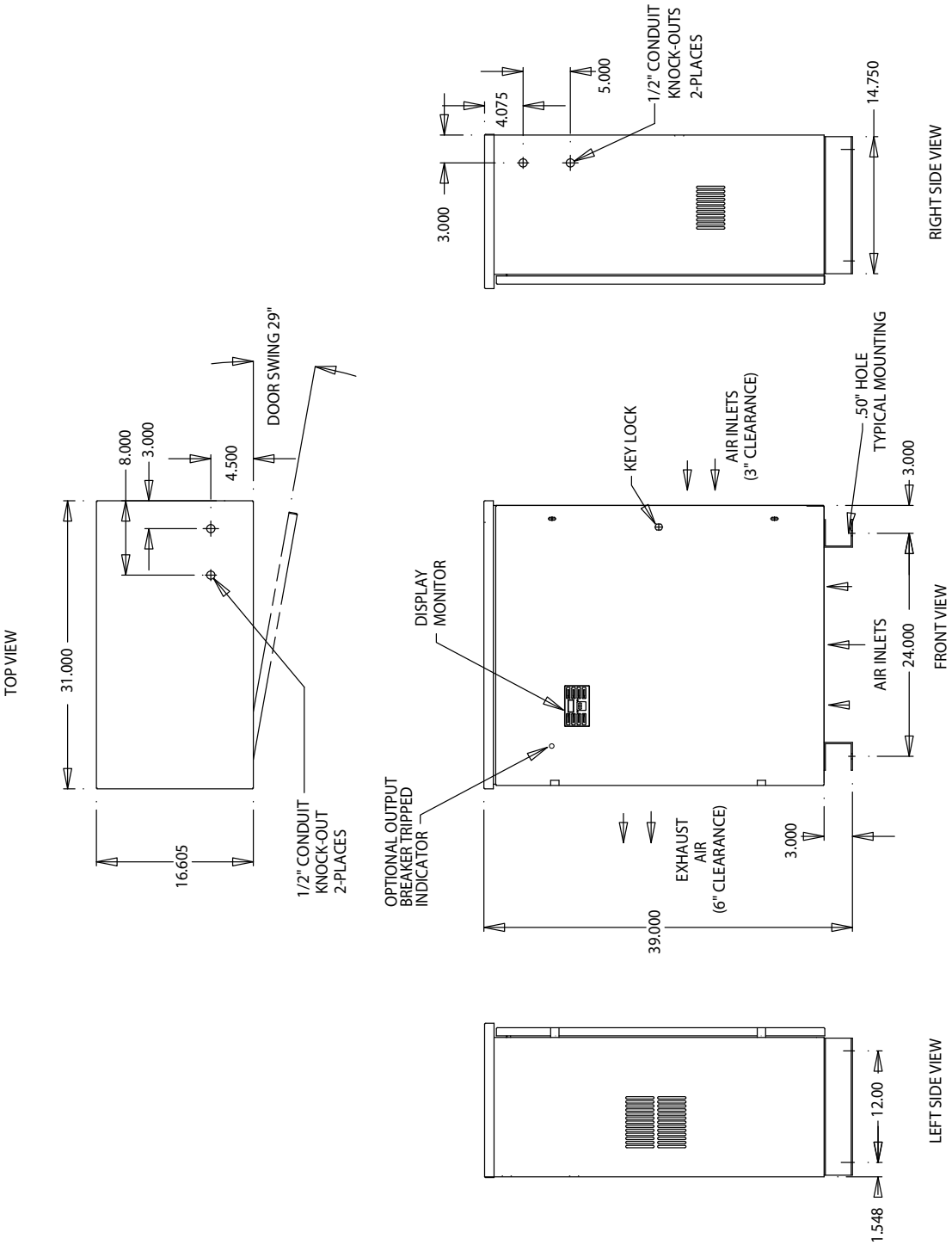
### AC INPUT / OUTPUT CURRENTS AND BTU

| | 120V | | | 208V | | | 240V | | | 277V | | | BTU |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| VA | INPUT CURRENT | INPUT BREAKER | OUTPUT CURRENT | INPUT CURRENT | INPUT BREAKER | OUTPUT CURRENT | INPUT CURRENT | INPUT BREAKER | OUTPUT CURRENT | INPUT CURRENT | INPUT BREAKER | OUTPUT CURRENT | BTU / HR |
| **700** | 5.2 | 15 | 5.8 | 3 | 15 | 3.35 | 2.6 | 15 | 2.9 | 2.25 | 15 | 2.51 | 250 |
| **850** | 6.3 | 15 | 7.1 | 3.7 | 15 | 4.1 | 3.2 | 15 | 3.5 | 2.73 | 15 | 3.08 | 304 |
| **1000** | 7.4 | 15 | 8.3 | 4.3 | 15 | 4.8 | 3.7 | 15 | 4.2 | 3.2 | 15 | 3.6 | 358 |
| **1200** | 8.6 | 15 | 10 | 5 | 15 | 5.8 | 4.3 | 15 | 5 | 3.73 | 15 | 4.33 | 430 |
| **1400** | 10 | 20 | 11.7 | 5.8 | 15 | 6.7 | 5 | 15 | 5.8 | 4.3 | 15 | 5.07 | 501 |
| **1600** | 11.9 | 20 | 13.3 | 6.9 | 15 | 7.7 | 6 | 15 | 6.7 | 5.2 | 15 | 5.76 | 573 |
| **1800** | 13 | 20 | 15 | 7.5 | 15 | 8.7 | 6.5 | 15 | 7.5 | 5.63 | 15 | 6.5 | 645 |
| **2100** | 14.9 | 20 | 17.5 | 8.6 | 15 | 10.1 | 7.5 | 15 | 8.8 | 6.5 | 15 | 7.58 | 752 |

## CABINET DIMENSIONS, ACCESSES AND CLEARANCES

### UPS PLACEMENT

Refer to the drawing below for installation clearances and ventilation requirements. The UPS should be placed in a dry, well ventilated or temperature controlled area. Be sure not to block any fan or air inlet areas of the UPS. Doing so will cause damage to the unit.



# BATTERY REQUIREMENTS

**Batteries of a specific manufacturer and model are required to maintain the system's UL listing. Use of batteries not recognized in the product's UL report will void its listing.**

| BATTERIES FOR LTN'S | |
|---|---|
| **MANUFACTURER** | **BATTERY MODEL NUMBER** |
| Enersys | NP24-12 |
| Enersys | NP38-12 |
| CSB | GP12400 |
| CSB | GP6120F2FR |
| East Penn Deka | U1HR1500 |
| East Penn Deka | 24HR3000 |
| East Penn Deka | HR3000 |
| East Penn Deka | 27HR3500 |
| East Penn Deka | HR3500 |
| East Penn Deka | 31HR4000 |
| East Penn Deka | HR4000 |
| GNB | S12V120F |
| C&D Technologies | UPS12-150MR |
| C&D Technologies | UPS12-210MR |
| C&D Technologies | UPS12-300MR |
| C&D Technologies | UPS12-350MR |
| C&D Technologies | UPS12-400MR |
| Northstar | NSB12-180 |
| Northstar | NSB12-300 |
| Northstar | NSB12-330 |
| Northstar | NSB12-400 |

****** WARNING ******

**BATTERY MAINTENANCE, INSTALLATION AND OR REPLACMENT SHOULD BE PERFORMED BY QUALIFIED PERSONNEL ONLY**

**CAUTION - HIGH VOLTAGE EXISTS, CAUTION MUST BE TAKEN WHEN WORKING NEAR THE BATTERY TERMINALS. POWER IS SUPPLIED BY MORE THAN ONE SOURCE. MAKE SURE AC CIRCUIT BREAKER IS OFF AND THE INPUT PLUG IS DISCONNECTED FROM BUILDING POWER BEFORE OPENING THE ENCLOSURE.**

# *BATTERY INSTALLATION*

**Batteries of a specific manufacturer and model are required to maintain the system's UL listing. Use of batteries not recognized in the product's UL report will void its listing.**

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**WARNING - USE THE FOLLOWING GUIDE WHEN HANDLING AND DISPOSING OF BATTERIES:**

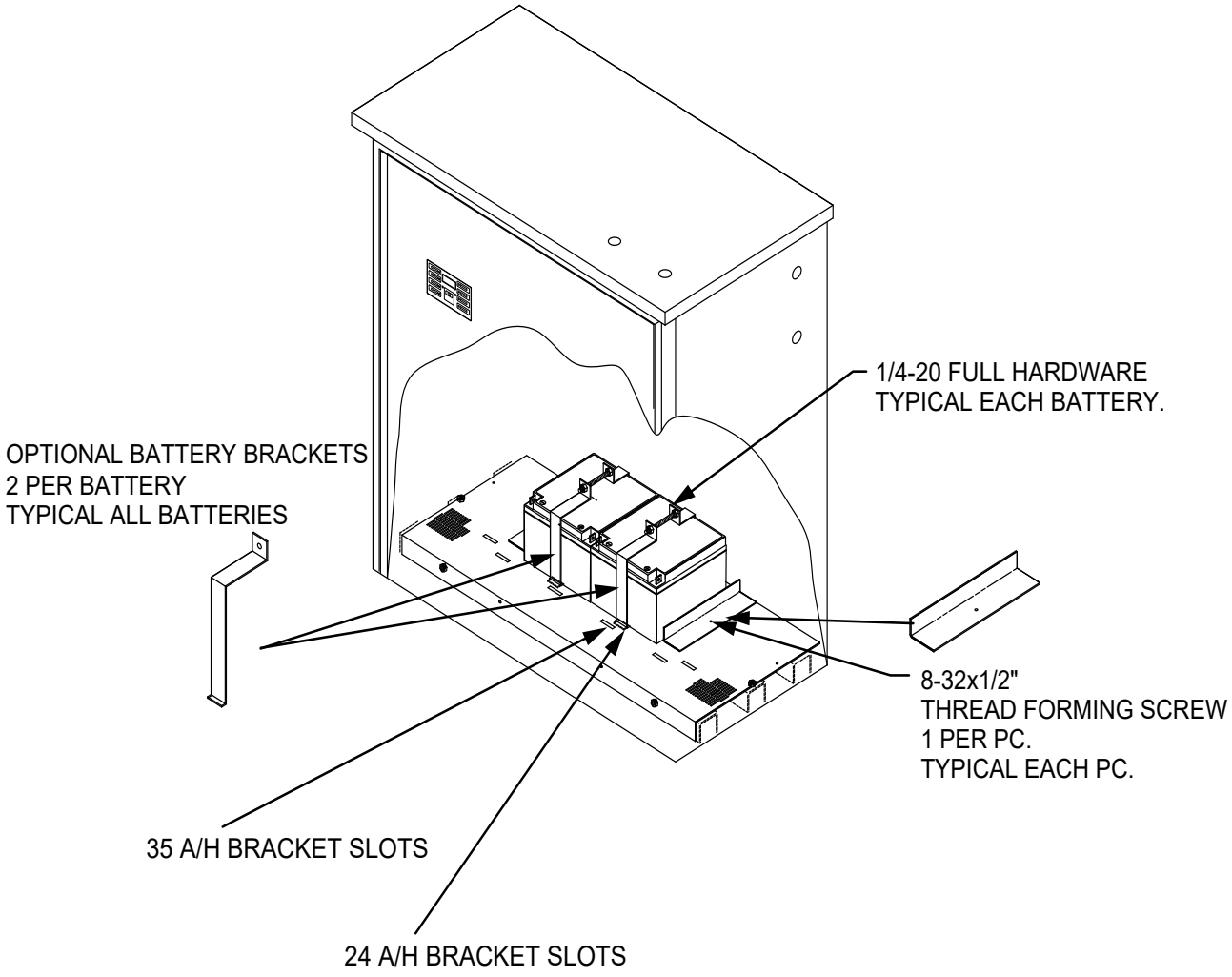
- **Do** replace batteries with the size and type specified. Remove and replace all batteries from the UPS at the same time.
- **Do** store batteries in a cool, dry place at normal room temperature.
- **Do** dispose of batteries according to the local laws and regulations of your region. Some batteries may be recycled, and may be accepted for disposal at your local recycling center. If you are not able to identify the applicable rules in your area, please check the instructions of the battery manufacturer.
- **Do** contact Controlled Power Company Customer Support if you have questions about proper handling of batteries. Batteries may present a risk of fire, explosion, or chemical burn if mistreated.

- **Do not** disassemble, puncture, modify, drop, throw, or cause other unnecessary shocks to batteries.
- **Do not** dispose of batteries in a fire or trash incinerator, or leave batteries in hot places such as a automobile under direct sunlight. Do not store batteries near an oven, stove, or other heat source.
- **Do not** connect batteries directly to an electrical source, such as a building outlet or automobile power-point.
- **Do not** place batteries into a microwave oven, or into any other high-pressure container.
- **Do not** immerse batteries in water or otherwise get them wet.
- **Do not** short circuit batteries; for example, do not carry loose batteries in a pocket or purse with other metal objects, which may inadvertently cause a battery to short circuit.
- **Do not** use batteries, or charge rechargeable batteries, that appear to be leaking, discolored, rusty, deformed; emit an odor; or are otherwise abnormal.
- **Do not** touch leaking batteries directly; wear protective material to remove the batteries and dispose of them properly immediately.
- **Do not** reverse the polarity (positive and negative terminals) of batteries.
- **Do not** mix used and new batteries, or install used batteries in other equipment.
- **Do not** charge non-rechargeable batteries, or use unspecified charging instructions or equipment for rechargeable batteries.
- **Do not** continue to charge batteries beyond the specified time.
- **Do not** give batteries to young children, or store batteries where children may access them.

## (2) 24A/H OR (2) 35 A/H BATTERY INSTALLATION

**NOTE - NOT ALL BATTERY MANUFACTURERS WILL HAVE THE (+) AND (-) POSTS AS SHOWN BELOW. USE EXTREME CAUTION WHEN WIRING.**

**WARNING - DO NOT PLUG IN DC CONNECTOR UNTIL READY TO APPLY AC POWER.**




**TOP BATTERY HOLD DOWN BRACKETS ARE OPTIONAL EQUIPMENT**

# *BATTERY INSTALLATION CONTINUED*

## (4) 24A/H OR (4) 35 A/H BATTERY INSTALLATION

**NOTE - NOT ALL BATTERY MANUFACTURERS WILL HAVE THE (+) AND (-) POSTS AS SHOWN BELOW. USE EXTREME CAUTION WHEN WIRING.**

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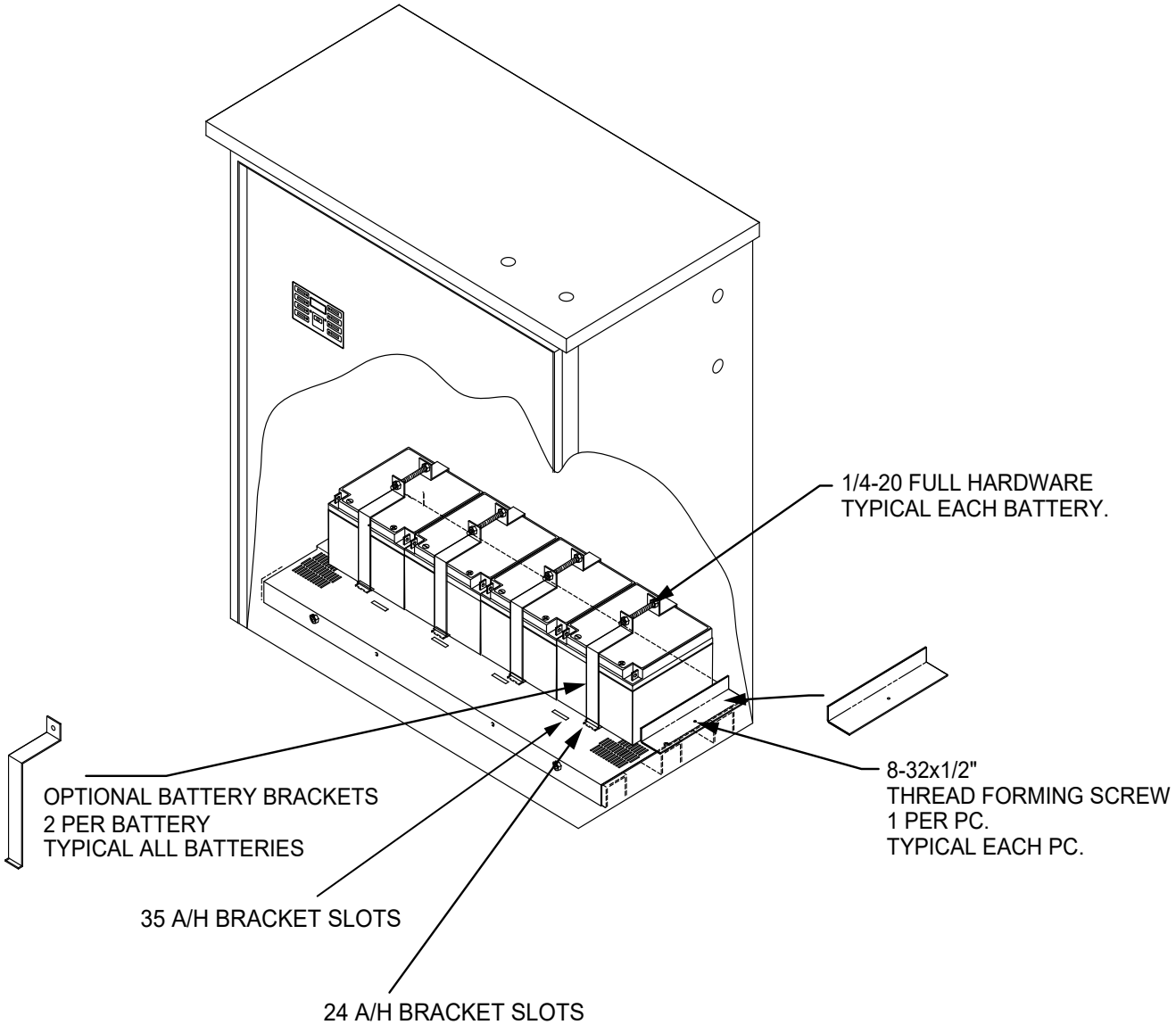
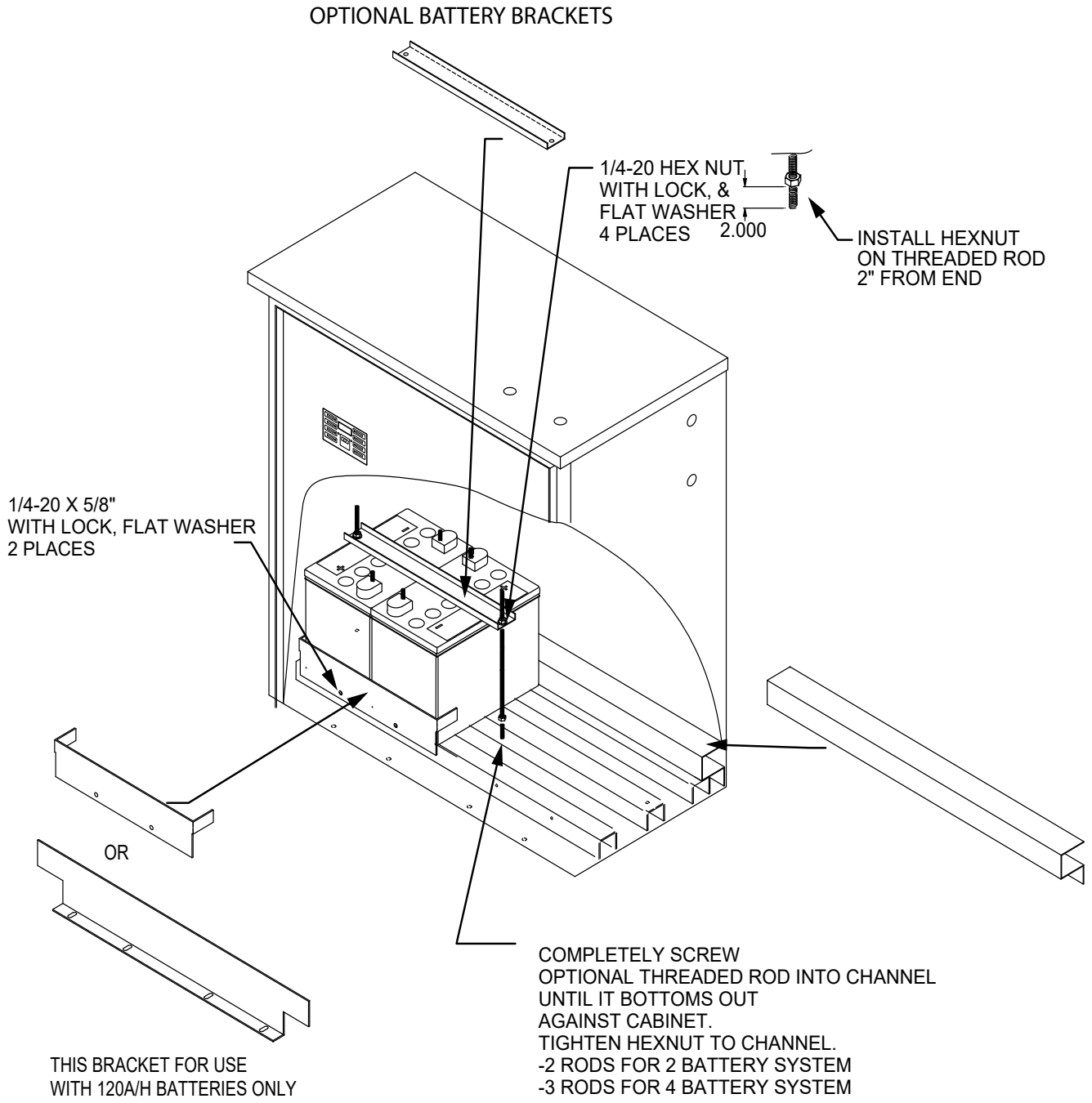



**TOP BATTERY HOLD DOWN BRACKETS ARE OPTIONAL EQUIPMENT**

## (2) 65A/H, 90A/H, 100A/H OR 120A/H BATTERY INSTALLATION

**NOTE - NOT ALL BATTERY MANUFACTURERS WILL HAVE THE (+) AND (-) POSTS AS SHOWN BELOW. USE EXTREME CAUTION WHEN WIRING.**

**WARNING - DO NOT PLUG IN DC CONNECTOR UNTIL READY TO APPLY AC POWER.**




**TOP BATTERY HOLD DOWN BRACKETS ARE OPTIONAL EQUIPMENT**

# *BATTERY INSTALLATION CONTINUED*

## (4) 65A/H, 90A/H, 100A/H OR 120A/H BATTERY INSTALLATION

**NOTE - NOT ALL BATTERY MANUFACTURERS WILL HAVE THE (+) AND (-) POSTS AS SHOWN BELOW. USE EXTREME CAUTION WHEN WIRING.**

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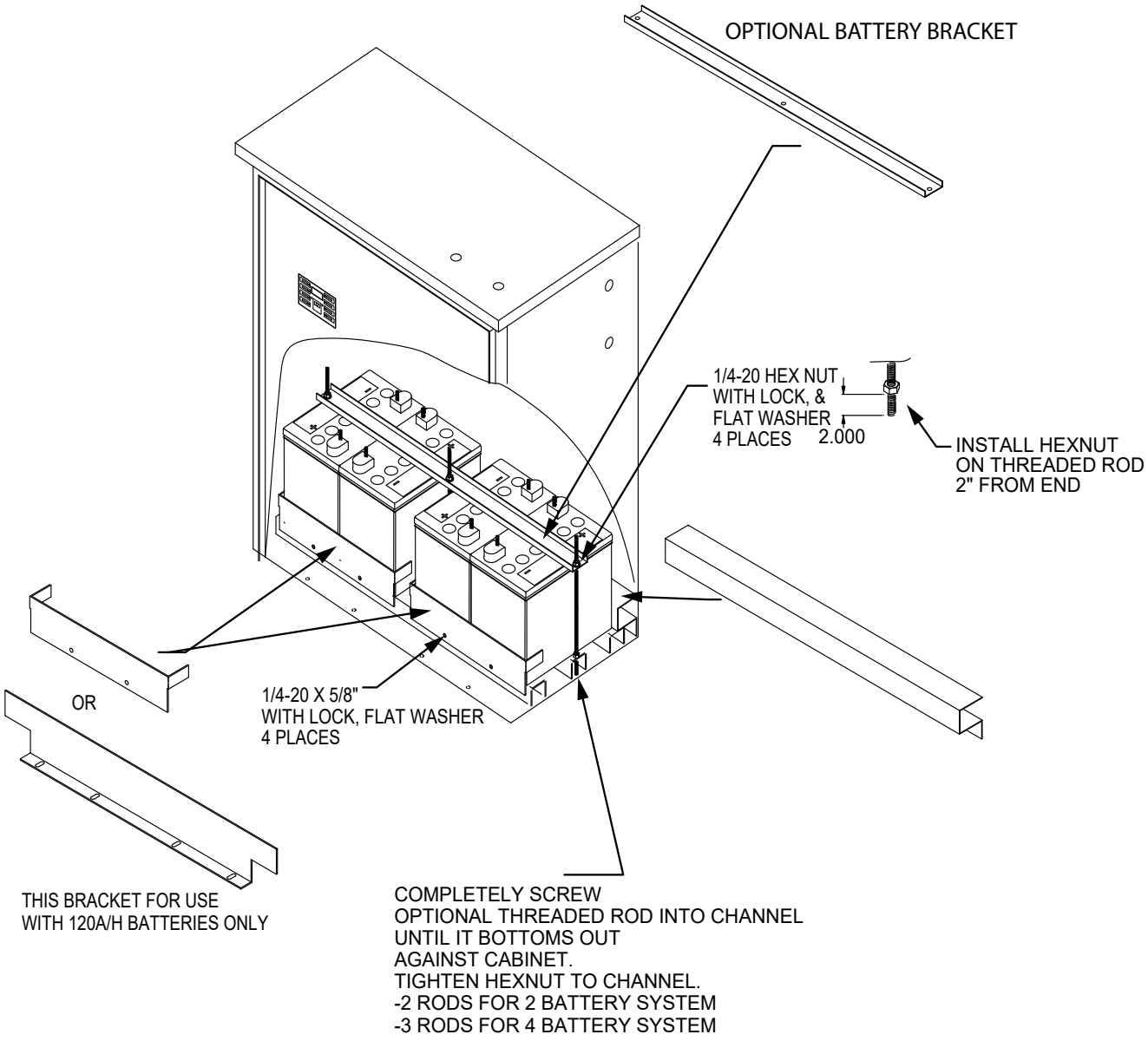



**TOP BATTERY HOLD DOWN BRACKETS ARE OPTIONAL EQUIPMENT**

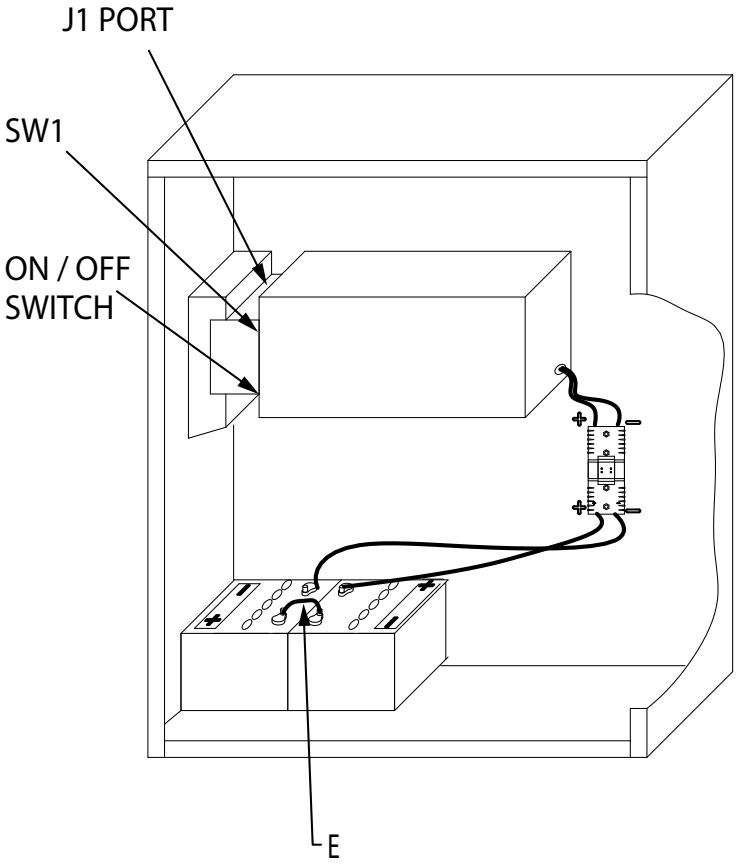
## TWO BATTERY SYSTEMS

The DC voltage for a two battery system is 24V. Batteries are wired in series. Included with the UPS is a kit for the wiring. Follow the steps and the diagram below noting the different lengths and labels of wire.

1. Place batteries in the lower section of the UPS.
2. Locate the proper sections of wire that correspond to the diagram below.
3. Wire the batteries in series, taking note of the polarity.
4. Once the batteries are wired, use a volt meter to measure the positive and negative leads. The voltmeter should read between +24V and +27V. If it is different recheck the wiring and test again.
5. Insert the male connector into the female connector on the UPS.

**NOTE - NOT ALL BATTERY MANUFACTURERS WILL HAVE THE (+) AND (-) POSTS AS SHOWN BELOW. USE EXTREME CAUTION WHEN WIRING.**

**WARNING - DO NOT PLUG IN DC CONNECTOR UNTIL READY TO APPLY AC POWER.**




| WIRE LABEL | QUANT. REQ'D | WIRE LENGTH | TERMINALS | |
|---|---|---|---|---|
| E | 1 | 6" | LUG | LUG |
| + - | 2 | 24" | LUG | ANDERSON LUG |

# BATTERY WIRING CONTINUED

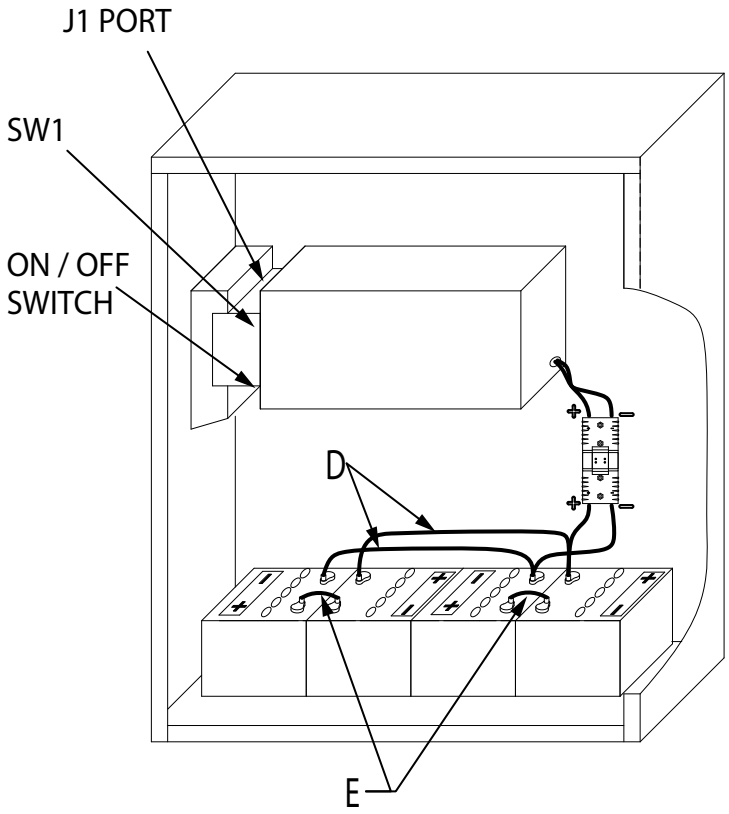
## FOUR BATTERY SYSTEMS

The DC voltage for a 4 battery system is 24V. Batteries are wired in series and in parallel. Included with the UPS is a kit for the wiring. Follow the steps and the diagram below noting the different lengths and labels of wire.

1. Place batteries in the unit.
2. Locate the proper sections of wire that correspond to the diagram below.
3. Wire 2 batteries in series. Repeat with the remaining 2 batteries.
4. Wire both sets of batteries together in parallel, taking note of the polarity.
5. Once the batteries are wired, use a volt meter to measure the positive and negative leads. The voltmeter should read between +24V and +27V. If it is different recheck the wiring and test again.
6. Insert the male connector into the female connector on the UPS.

**NOTE - NOT ALL BATTERY MANUFACTURERS WILL HAVE THE (+) AND (-) POSTS AS SHOWN BELOW. USE EXTREME CAUTION WHEN WIRING.**

**WARNING - DO NOT PLUG IN DC CONNECTOR UNTIL READY TO APPLY AC POWER.**




| WIRE LABEL | QUANT. REQ'D | WIRE LENGTH | TERMINALS | |
|---|---|---|---|---|
| D | 2 | 15" | LUG | LUG |
| + - | 2 | 24" | LUG | ANDERSON LUG |
| E | 2 | 6" | LUG | LUG |

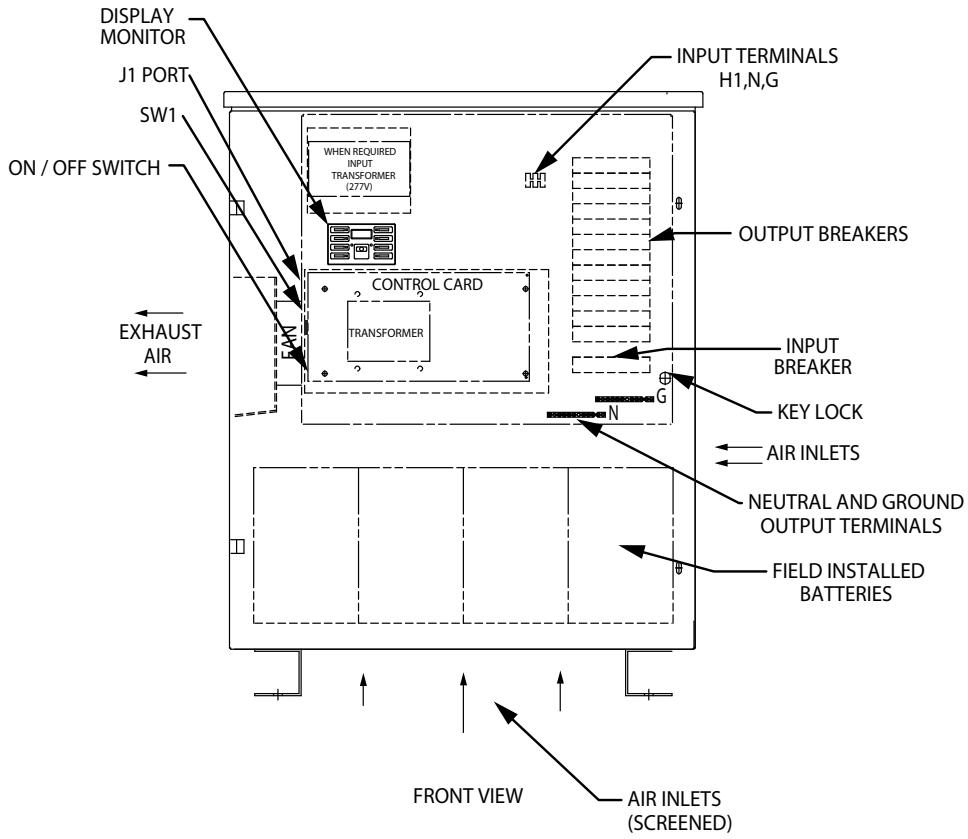
***** WARNING *****

**CAUTION - RISK OF ELECTRICAL SHOCK.**

**THE UPS RECEIVES POWER FROM MORE THAN ONE SOURCE. BE SURE ALL UTILITY CIRCUIT BREAKERS ARE IN THE OFF POSITION AND THE BATTERY CONNECTOR IS UNPLUGGED BEFORE SERVICING.**

### UPS Wiring With Distribution

Input wiring is performed at the input terminal strip. Output wiring is performed at the load side of the circuit breakers. Distribution breakers come optionally pre-wired from the factory or may be field installed. It is recommended that all wiring is performed according to NEC standards and local codes.




NOTE: TERMINAL TORQUE AND WIRE RANGE

INPUT TERMINAL BLOCK

#20-#8 AWG TORQUE 17 IN.LB

CIRCUIT BREAKER

#14-#2 AWG AL/CU TORQUE 45 IN.LB

NEUTRAL AND GROUND OUTPUT TERMINALS

| | |
|---|---|
| #14-#10 CU, #12-#10 AL | TORQUE 20 IN.LB |
| #8 AWG | TORQUE 25 IN.LB |
| #6-#4 AWG | TORQUE 35 IN.LB |
| (2) #14 OR #12 CU | TORQUE 25 IN.LB |
| (2) #12 OR #10 AL | TORQUE 25 IN.LB |

# *SET UP PROCEDURES*

Prior to turning on the power and starting the UPS, it is very important to check out the mode in which you intend to operate the system.

All operating parameters are factory set to standard operating modes.

Selector switch SW1 at the rear of the UPS allows you to change the mode of operation that best suits your specific needs.

## SELECTOR SWITCH SW1 (DIP SWITCH SELECTING) **(See page 17 for switch location]**

**Operating Mode**
**Note: "ON" is down.**

**Position #1** - ON = Slew rate fast - this selection typically used when UPS must track rapidly changing input frequency. i.e. engine generators (do not change this switch with UPS on).

**Position #2** - ON = Slew rate normal (do not change this switch with UPS on). Note: Only 1 switch may be on at a time for position 1 and 2. Turn position 1 on and 2 off if UPS switches to batteries often.

**Position #3** - ON = Audible alarm on, OFF = Alarm silence.

**Position #4** - During extended power outages the UPS will automatically turn off to prevent total battery depletion. Upon return of utility power you have the option for the UPS to turn on automatically ormanually by resetting the on/off switch. ON = Auto Restart OFF = Manual Restart

## GENERATOR APPLICATIONS

If your UPS is going to operate with a generator system, the following changes will be needed.

1) Slew Rate Change – You will need to change selector switch SW1 on the back of the UPS from "normal" to "fast" slew rate.

2) System Set Point Changes – Change the system set points as noted below. Refer to the *"Communications"* section for instructions on how to change the set points.

### SYSTEM SET POINTS – GENERATOR APPLICATIONS ONLY

| Description | Value entered w/ no al input voltage = 120V | Value entered w/ nominal input voltage = 208V | Value entered w/ nominal input voltage = 240V |
|---|---|---|---|
| High Line Switch Point | % = 115 | % = 115 | % = 115 |
| Low Output Frequency Alarm Set Point | 57 | 57 | 57 |
| High Output Frequency Alarm Set Point | 63 | 63 | 63 |
| Low Line Sample Accumulation Set Point | Available (1-2) = 2 | Available (1-2) = 2 | Available (1-2) = 2 |
| Frequency Accumulation Buffer | Available (2-9) = 9 | Available (2-9) = 9 | Available (2-9) = 9 |

**Note** : All other parameters remain at Factory Preset Levels – refer to the *"Communications"* section for remaining parameters.

**DO NOT ATTEMPT TO OPERATE THE UNIT UNTIL THE FOLLOWING STEPS HAVE BEEN COMPLETED**

- Verify the input voltage matches the UPS input volts and the UPS output voltage matches the equipment'sinput voltage.
- Turn off all loads attached to the UPS.
- Turn on the input service breaker.

  NOTE: Batteries require charging for 6 to 8 hours (sometimes longer). Backup time is reduced until batteries are fully charged.
- Turn on the source breaker feeding the UPS followed by the UPS AC Input breaker. T**hen turn the On/Off switch located inside the cabinet to the "on" position (See page 17 for switch location].** There will be a few seconds delay as the unit comes on. The digital display and "System On" LED will illuminate. Scroll to the "Output Volts" function and make sure the output voltage is correct.
- Verify the output voltage on the UPS matches the load requirement. Do not connect the equipment if the output voltage is out of specification, contact factory.
- Simulate a power loss by turning off the AC INPUT BREAKER ONLY, located inside the UPS.

  An "Audible Alarm" will sound and the following LED's will illuminate.

  - System On - System on Battery - Alarm
- While on inverter, verify the output voltage on the UPS matches the load requirement while on\batteries. Do not apply power to the load if output voltage is out of specification, contact factory.
- Turn on the AC Input breaker and the UPS will return to utility power.
- With the UPS running and System On LED illuminated, turn on the output circuit breakers and loads.
- Some loads start hard and may cause the UPS to display a temporary overload. This is normal and in no way damage the UPS.
- If the overload persists and is in excess of 150% the UPS will shut off within ten minutes. If the unit is overloaded some of the loads will have to be removed or the UPS must be expanded.

## OPTIONAL AUTOMATIC MESSAGE DIALER

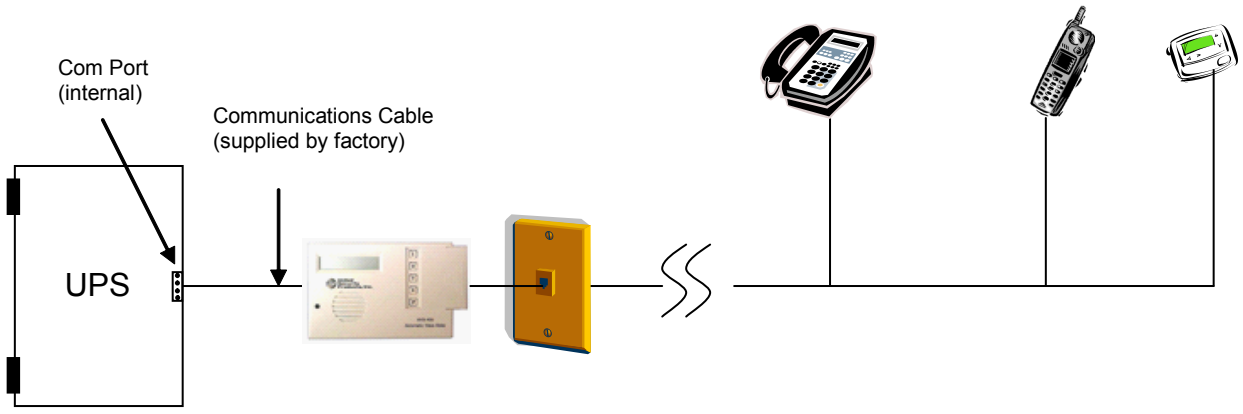
An Automatic Message Dialer is available on the Controlled Power Company line of Inverters. The Automatic Message Dialer is a device that notifies certain personnel if there is a problem with the inverter via an analog phone line. The Automatic Message Dialer is a small box that plugs into the communications port of the inverter. All that is required for the device is an analog phone line and it is ready to go!

Here's how it works: If in the event that there is an alarm condition, the Automatic Message Dialer will dial up to 4 numbers; these can be landline phones or cell phones. When a call is answered or sent to voice mail, the Automatic Message Dialer will play a customer-recorded, voice message.

Here are some features of the Automatic Message Dialer:

- Dials up to 4 numbers
- Custom voice message
- Programmable delay prevents nuisance dialing
- Internal or external battery backup for memory retention
- Power supply included

Here is how it is connected:




**NOTE: The power supply for these options MUST be taken from the output of the UPS. A 120V receptacle (5-20R) whose supply is taken from the output of the UPS must be installed near the location of the Automatic Message Dialer. A standard phone receptacle and phone cord is also required to complete the circuit.**

Refer to the manual that accompanied these devices for features, function, use and installation Instructions.

# OPTIONAL REMOTE ANNUNCIATOR INSTALLATION

Please read this entire instruction set before installing!
Turn off all power before installing or servicing!

## REMOTE ANNUNCIATOR

Controlled Power Company's Remote Annunciator is capable of displaying status conditions of an Uninterruptible Power Supply and alarming under critical conditions. The following installation instructions include operation, wiring, and mounting your Remote Annunciator.

## OPERATION

During normal operation of the UPS, the Remote Annunciator will illuminate the green UPS On LED. During an alarm condition (unit over temperature, utility fail, etc.) the red General Alarm LED will illuminate along with other applicable LED's indicating the nature of the alarm and the audible alarm will sound. The On Bypass LED is inactive for LTN Systems. The audible alarm can be silenced by pressing the Alarm Silence button on the front of the unit. If another alarm condition occurs (i.e. low battery), the alarm will resound. The audible alarm can be altogether defeated by changing jumper J1 on the circuit board. See the back side of the Remote Annunciator for J1 jumper setting.


**Figure 1: Remote Annunciator**

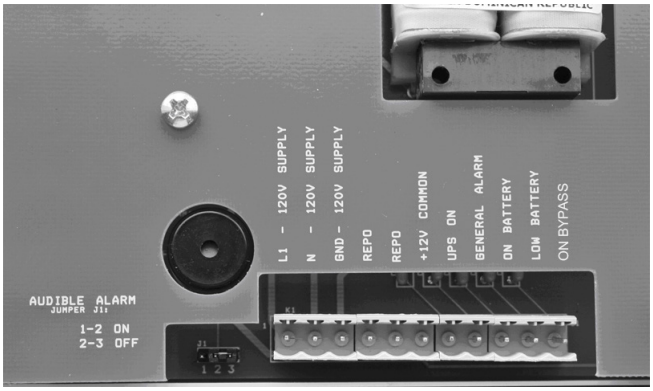



**Figure 2: Rear of Remote Annunciator showing J1 and terminal header**

## WIRING

The wiring of the Remote Annunciator consists of two feeds. One being the communication cable supplied with the unit, and the other is 120Vac 50/60Hz from the output of the UPS it is monitoring. The power supply can be taken directly from an output breaker on the unit, a receptacle or panel that is fed by the UPS or a nearby circuit fed by the UPS. From the UPS, run the communication cable to the location of the Remote Annunciator. The cable may be run through conduit, walls or cable tray/raceway, but care must be taken not to pinch, cut or kink the cable. After the cable is run, trim excess cable or coil in a safe location. Both feeds, after entering the box, must be wired to the supplied connector as shown in Fig 3. Use standard 1/2" box connector clamps to anchor the wire to the box (not supplied).

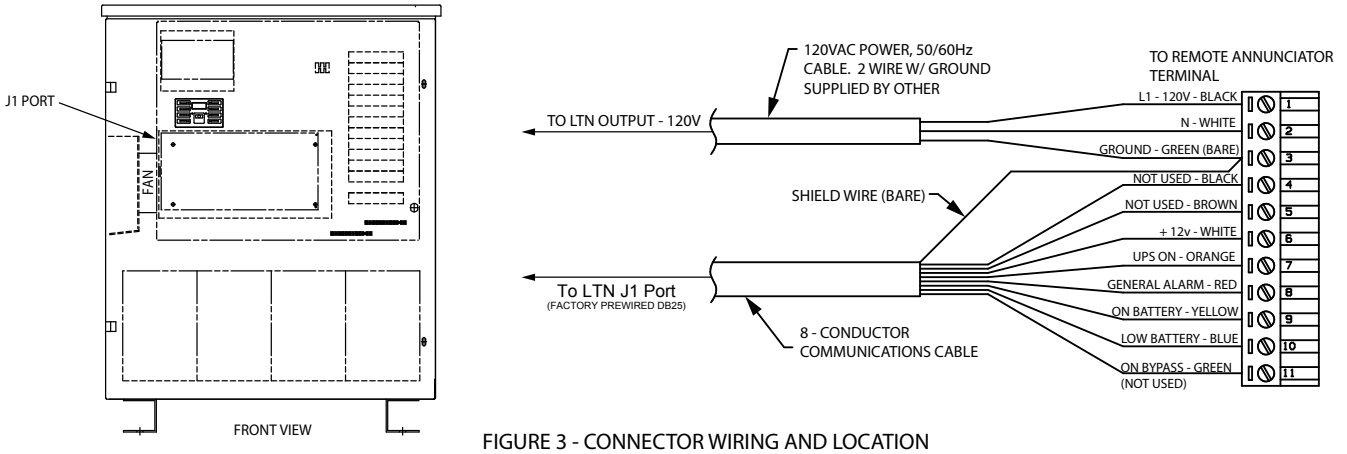



FIGURE 3 - CONNECTOR WIRING AND LOCATION

## NOTES:

1. All wires to connector must be stranded, maximum 12 AWG.
2. If using solid conductor for AC power, splice in length (minimum 4”) of stranded wire to connector.
3. Strip outer sheathing and foil back minimum 2”.
4. Strip all wires 0.25”.
5. 120V supply must come from UPS output. Power must be present in event of utility failure.
6. Connector on other end of communication cable to be factory wired.

After all cable routing and connector wiring is complete, plug Remote Annunciator connector into the terminal header.

## MOUNTING

The Remote Annunciator is designed to be wall mounted with wiring inputs through the rear or top/bottom (using conduit). Flipping out the side doors, remove the four screws fastening the cover to the box. The cover is attached to the box with two plastic retaining straps. Using the four holes in the back of the box and proper anchors (not supplied), mount the unit to drywall, masonry, paneling or any other type of wall. Holes are provided for rear cable entry. If top or bottom entry is desired, holes must be drilled in recommended location for (maximum 1/2”) conduit (Fig. 4).

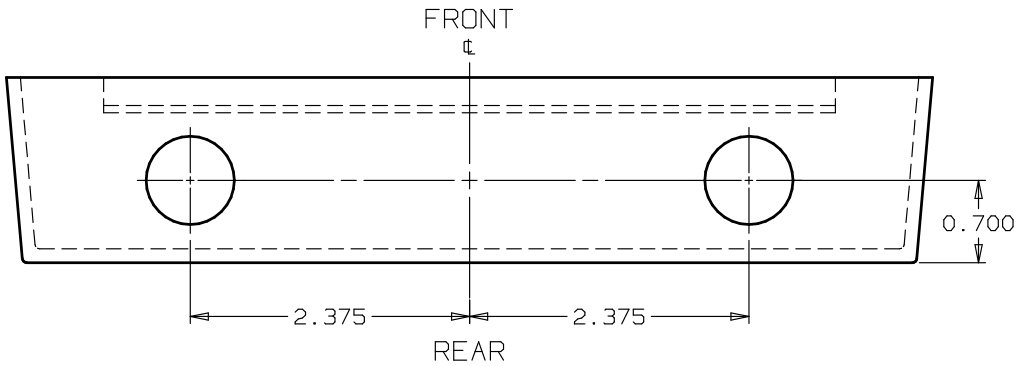



**Figure 4: Drilling locations for top/bottom conduit entrance.**

## NETMINDER REMOTE COMMUNICATIONS

The NetMinder UPS Management Suite and NetMinder CS141 Series of Ethernet Adapters inform of the status and condition of the UPS and the incoming electrical power, as well as protect the LAN / WAN from unwanted downtime and unnecessary maintenance costs. NOTE the CS121 has been discontinued and replaced by the CS141. The CS121 is still supported.

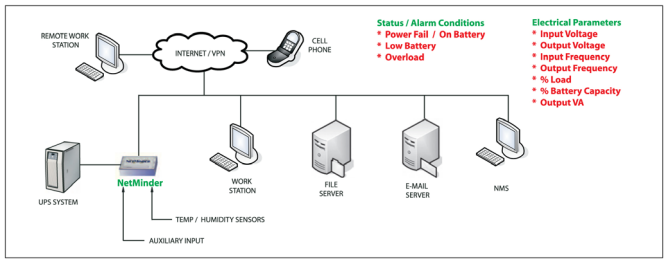
### *NetMinder UPS Management Suite Programs (CD)*

**NetMinder UPSMAN**
Performs all UPS monitoring and data logging. Executes all alarm notifications, network configurations, and server shutdown requests.

**NetMinder UPSMON**
Works in conjunction with UPSMAN to give a visual display of UPS status, electrical parameters, alarm conditions, and system logs.

**NetMinder RCCMD**
Client-side application that performs an orderly, unattended shutdown of servers. RCCMD can receive its shutdown instructions from either a UPSMAN server, a
UNMSII server, or a CS141 web server.

**NetMinder UNMSII (basic version)**
Server-side application that centralizes monitoring and
e-mail alarm reporting of up to (9) Controlled Power Company UPS's, from a single terminal. Note that the full version of UNMSII includes SNMP notification, as well as the ability to monitor up to an unlimited number of UPS's. Contact Controlled Power Company for additional details.



*Alarm and event notification via local and remote monitoring, e-mail, and cell phone text messaging.*

### *NetMinder CS141 Series of Ethernet Adapters*

The NetMinder CS141 series of adapters provide complete integration of the UPS into an Ethernet or RS485 network, and thereby provide 24 / 7 monitoring of UPS status, electrical parameters, and notification of alarm conditions. With the ability to communicate in Ethernet TCP/IP, MODBUS TCP, and MODBUS RS485 network environments, the CS141 adapters keep system personnel informed and alerted to any critical condition. When used with NetMinder RCCMD, all CS141 adapters provide added network protection from downtime, and prevent unnecessary maintenance costs that result from data corruption and server crashes.

The NetMinder CS141 Ethernet Adapter is available in (3) unique versions:

**CS141B:** Ethernet / SNMP / TCP/IP Adapter
**CS141L:** Advanced Ethernet / SNMP / TCP/IP / MODBUS TCP Adapter with facilities monitoring I/O and auxiliary contact closure inputs.
**CS141L-485:** Advanced Ethernet / SNMP / TCP/IP / MODBUS TCP / MODBUS RS485 Adapter with auxiliary contact closure inputs.

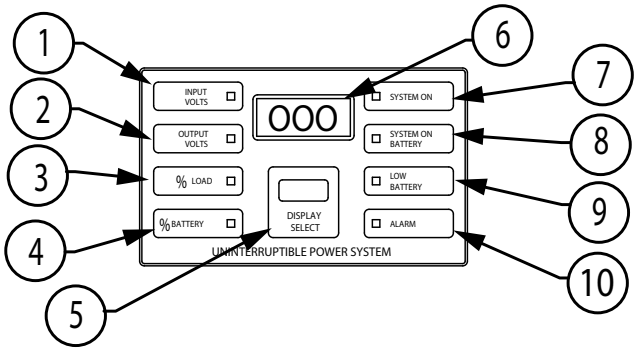
***NetMinder CS141 Features & Benefits***

- Real-time Remote UPS Monitoring
- Web Server Based
- MODBUS ASCII and RTU
- Graphic Event and Data Trending
- Exportable Data and Event Logging for Trending Analysis and Troubleshooting

**See the accompanying communications manual for setup instructions.**

**See *"Communications Description"* for port locations.**

## LTN DISPLAY OPERATION
## (Front Of UPS, Door Closed)




**DISPLAY PANEL**

1. Input Volts - LED ON indicates unit is monitoring the input voltage via the digital display. This function is activated by pushing the display select button.

2. Output Volts - LED ON indicates unit is monitoring the output voltage via the digital display. This function is activated by pushing the display select button.

3. Percent Load - LED ON indicates unit is monitoring the output load capacity relative to maximum watts via the digital display. This function is activated by pushing the display select button.

4. Percent Battery - LED ON indicates unit is monitoring the percentage of battery charge via the digital display. When operating on battery power the digital display monitors percentage of battery time remaining.

5. Display Select - This push-button selects 1 of 4 monitor functions mentioned above and displays the results on the digital display.

6. Digital Display - Three digit display monitoring the four previous functions. This display monitors one function at a time and is selected by the “Display Select” push-button.

7. System On - LED ON indicates the on/off switch is on and AC power is available at the input. LED will remain on when unit is on battery power.

8. System On Battery - LED ON indicates the UPS is on battery power accompanied by an audible alarm. The UPS may switch to battery power even when it appears there are no power outages. The reason is that the UPS detects input sags and surges and does not necessarily require a total power loss to switch to battery power. The UPS will remain on battery power for a few seconds after normal AC power is restored.

9. Low Battery - LED ON indicates batteries are low and a total UPS shutdown is imminent unless AC power returns. This alarm setpoint is user selectable via the communications port (see Communications section) to turn on at a predetermined percentage of battery time remaining. Percentage is selectable from 10% to 90% of battery remaining. Standard selection is 40%.

10. Alarm - LED ON is accompanied by an audible alarm for a number of alarm functions (see Communications section). Alarm will clear automatically once the alarm condition is resolved.

SW1 - This is a selector switch with the following functions:

Position #1 - ON = Slew rate fast - this selection typically used when UPS must track rapidly changing input frequency. i.e. engine generators (do not change this switch with UPS on).

Position #2 - ON = Slew rate normal (do not change this switch with UPS on). Note: Only 1 switch may be on at a time for position 1 and 2. Turn position 1 on and 2 off if UPS switches to batteries often.

Position #3 - ON = Audible alarm on, OFF = Alarm silence.

Position #4 - During extended power outages the UPS will automatically turn off to prevent total battery depletion. Upon return of utility power you have the option for the UPS to turn on automatically or manually by resetting the on/off switch.

ON = Auto Restart OFF = Manual Restart

## COMMUNICATIONS

Three methods can be used to communicate with the UPS:

- Direct connect to a terminal.
- Direct connect to a PC that is operating as a terminal emulator or a communication software that will emulate a terminal.
- Modem operation.

Once the communication link is established, system set points, system parameters, system status and memory modification is attainable.

Any system status change will automatically cause the UPS to send an alert warning signal. The signal sent is "?". User software can be written to identify this signal and initiate automatic unattended action.

### J1 PORT - DB25 PIN FUNCTION

| Pin # | Name | Description |
|---|---|---|
| 1 | UPS On (Battery Operation) | Closes on battery operation |
| 2 | Receive Data | RS/232 |
| 3 | Transmit Data | RS/232 |
| 6 | (+) 10 VDC Supply | Limited to 1 mA |
| 7 | Signal Ground | Communication signal ground |
| 8 | UPS On (Ready) | Closes when UPS is ready |
| 11 | Low Battery Alarm (Shutdown Pending) | Closes when low battery |
| 14 | General Alarm | Closes on alarm condition |
| 20 | (+) 10 VDC Supply | RS/232 |
| 21 | (-) 10 VDC Supply | Limited to 1 mA |
| 23 | Remote Emergency Power Off | Positive DC input w / reference to ground shuts unit off |
| 25 | Signal Ground | Communication signal ground |

Pins 8, 1, 11 and 14 are open collector transistor, 40V Max. requiring a pull up resistor, 300mA Max. The contacts are referenced to pins 7 or 25 which is chassis ground.

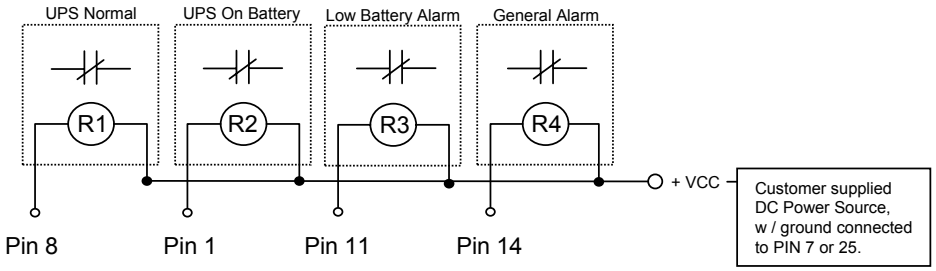
Pin 23 requires a high input limited to 20 VDC with reference to pin 7 and 25 (ground) or the +10 VDC signal at pin 6 may be utilized with an external contact.

### RS232 TECHNICAL SPECIFICATION SUMMARY

| | |
|---|---|
| Connector | 25 Pin, Type D, Female |
| Format | ASCII 8 bit, One Start Bit, One Stop Bit |
| Parity | None |
| Duplex | Full |
| Delimiters | Carriage Return per Block |

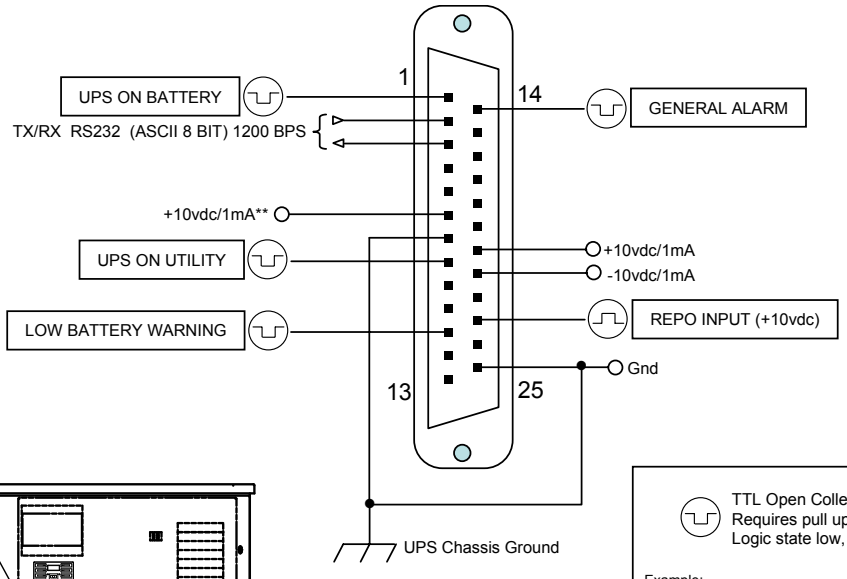
Baud Rate – 1200 BPS. Standard SNMP operation is 9600 BPS. Default is 1200 BPS.

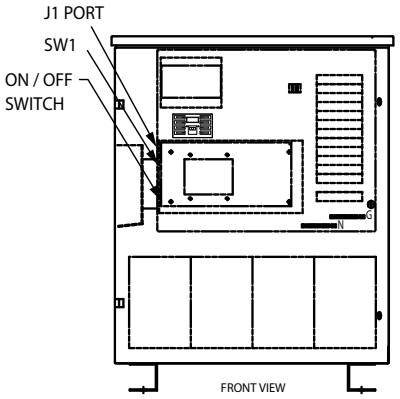
Customer Supplied Slave Relays for alternate voltage/current and isloation requirements
(Recommended to insure proper interface without operational interference)

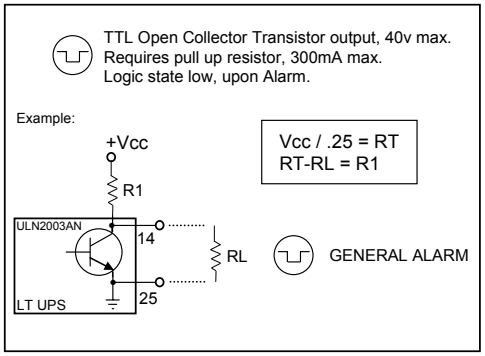



R1-R4 contact and coil specifications to match customer alarm interface and DC Power Source requirements.

LTN UPS
J1 Port / DB25




**Note: 1mA is not enough to drive most discrete relay devices
Use only for REPO control or TTL Logic control.

## COMMUNICATING WITH THE UPS

There are alarm and operation set points that will alter the behavior of the UPS. It is not recommended that these be modified without a complete understanding of the function. Consult Customer Support at 1-800-521-4792 prior to modifying set points.

**MINIMUM SYSTEM REQUIREMENTS:**

1. Computer/Laptop with Windows 3.1 or later.
2. “Hyperterminal” (Windows 3.1, Windows XP) or “PuTTY” for Windows Vista and Windows 7 or later. (download at http://www.putty.org/).
3. USB Port and a DB25 to USB Null Modem Conversion Cable - for use with all Windows operating systems and “Hyperterminal” or “PuTTY” emulation programs.

**PROCEDURE**

1. Connect the DB25 to USB Null Modem Conversion cable from J1 on the rear of the UPS to the USB port on a computer.

2. Make sure the UPS in ON and running.

3. Start Windows on the computer, access “All Programs” then “Accessories” then “Communications” then “Hyper Terminal” for Windows 3.1 or Windows XP. Or launch “PuTTY” for Windows Vista and Windows 7 or later.

4. In the Hyperterminal “Connection Description” window, enter any name then choose any icon - Click OK. For “PuTTY” users, Connection type = Serial, Serial Line = Com Port of computer being used, Speed = 1200. “PuTTY” users can name and save the session for later use. “PuTTY” users skip to step 7.

5. In the Hyperterminal “Connect To” window, choose “Connect Using” and select the comport you are using, Click OK.

6. In the Hyperterminal “COM Port Settings” window, set the following parameters: 1200 Baud, 8 data bits, 0 parity, 1 stop bit, flow control = xon/xoff, then click OK.

7. To enter into the “Memory Modification Group” type a lower case “m” and hit “ENTER”.

8. The response will be: PASSWORD=

9. Enter a lower case “sps-92”. then hit “ENTER”

10. Upon entering the correct password, one line item will be displayed at a time, i.e.,

    Min AC Start = 204

    Min AC Start = If the value is to remain unchanged press ENTER and the next parameter will appear or else type the new value. After entering the new value press “ENTER” to scroll to the next parameter. To end the process type a lower case “e”.

11. After making the desired changes, send a lower case “p” and the System Parameters will appear on the screen. Verify the changes that you have made. If further changes are required, go back to step 7.

12. At this point you are already out of the “Memory Modification Group” (after entering the lower case ”e” in step 10).

13. Disconnect the communications cable.

**COMMUNICATIONS - CONTINUED**

**SYSTEM PARAMETERS**

The following lists parameters the UPS monitors and also system status of the UPS while operating.

To access System Parameters and Status send the lower case “s” to the UPS from the terminal.

You must hit the “s” key each time to update system status.

| Description | Sample Display | Description |
|---|---|---|
| AC Volts In | Input Line Voltage = 240 | The voltage the UPS is receiving |
| AC Volts Out | Output Voltage = 240 | The voltage the UPS is delivering to the load |
| Battery Volts | Batter Voltage % = 98 | Percentage of full charge of the battery |
| AC Amps Out | Output Current = 2.4 | Amperage the load draws from the UPS |
| % of Full Load | Load % = 90 | The percentage of total capacity that the load is using |
| Watts Out | KW = .54 | The total real power the UPS is delivering to the load |
| Volt Amps Out | KVA = .77 | The total apparent power the UPS is delivering to the load |
| Power Factor | Power Factor = 0.70 | The power factor of the load (KW/KVA) |
| Incomming Line Frequency | Frequency = 60.0 | Displays the input frequency when on line, output frequency when on inverter |
| Crest Factor | Crest Factor | Peak Current / RMS Current |
| Outages | Outage | The number of outages recorded from the last clear function |
| Overloads | Overload | The number of overloads from the last clear function |

**SYSTEM STATUS**

| Description | Sample Display | Description |
|---|---|---|
| Synchronization | Synchronization | When the UPS is in sync with the line frequency |
| UPS On | UPS On | When the UPS is producing an output voltage |
| Low Battery Warning | Low Battery Warning | When the battery level reaches the preset value of alarm condition |
| On Battery | On Inverter | When the UPS is supplying output power from the batteries |
| Overload Alarm | Overload Alarm | When the UPS is supplying more power than its rated capacity |
| Low Output | Low Output | When the output voltage goes lower than the preset alarm condition |
| High Output | High Output | When the output voltage exceeds the preset alarm condition |
| Check Battery | Check Battery | When the battery discharge is greater then normal |
| Frequency Fault | Frequency Fault | When the fault exceeds the preset range of alarm conditions |
| Overtemp Warning | Overtemp Warning | When the UPS temperature reaches a critical level. immediate shut-down. |
| Shorted SCR Shutdown | Shorted SCR Shutdown | When the power electronic switch is shorted |
| Low Battery Shutdown | Low Battery Shutdown | When the batteries are depleted the UPS shuts off |
| Output Shutdown | Output Shutdown | If selected, the UPS will shutdown when the output exceeds set points |
| Output Warning | Output Warning | If selected, UPS will alarm when output exceeds set points |

## COMMUNICATIONS - CONTINUED

### SYSTEM SET POINTS

To access System Set Points send the lower case “p” to the UPS from the terminal. Note: This allows monitoring of system set points only.

| Description | Sample Display | Password | Explanation |
|---|---|---|---|
| Minimum AC Start Voltage | 204 | Required | Minimum AC voltage required before the UPS will start. |
| Maximum AC Start Voltage | Max AC Start = 264(+15% Max) | Required | If the input voltage exceeds this value, the UPS will not start |
| Low Output Alarm Setpoints | Low Output = 210 | Required | Alarm or shutdown if the output voltage dips to this set value. |
| High Output Alarm Setpoints | High Output = 264 | Required | Alarm or shutdown if the output voltage reaches this set value. |
| Low Battery Warning Set Point | Low Battery (%) -<br>Min = 010<br>Max = 070 | No Access | Percent of battery capacity alarm set value. |
| High Battery Warning Set Point | High Battery (%) = 105 | No Access | Manufacturer set point for diagnostics and charger control. |
| Low Frequency Alarm Set Point | Low Frequency = 059<br>Max = 057 | Required | Alarm or shutdown if the output frequency dips to this set value. |
| High Frequency Alarm Set Point | High Frequency = 061<br>Max = 063 | Required | Alarm or shutdown if the output frequency reaches this set value. |
| Over Temperature Set Point | Over Temperature = 160 | No Access | Manufacturer set point. |
| Nominal Input Voltage | Input Nominal = 240 | Required | Nominal input voltage. Switch set points are calculated from this value. |
| Nominal Output Voltage | Output Nominal = 240 | Required | Nominal output voltage. Value from which other calculations are derived. |
| Maximum KVA Rating | Output VA = 850 | Required | Maximum KVA rating of the UPS. |
| Low Line Switch Point. NOTE: Fuzzy Logic is entered as shown | Sag Switch Point (%) = 065<br>Fuzzy Logic = 000<br>Fuzzy Plus = 001 | Required | Percent below nominal AC input when the UPS will switch to battery operation. |
| High Line Switch Point | Surge Switch Point (%) = 110<br>(%) = 115 Max | Required | Percent above nominal AC input when the UPS will switch to battery operation. |
| Low Line Sample Accumulation Buffer | Sensativity (1-2) = 1 | Required | Averaging factor for low line voltage. 1 = least averaging (greater sensitivity). |
| Frequency Accumulation Buffer | Frequency Delay (2-9) = 8 | Required | Number of AC cycles required to be out of set frequency range prior to switching to inverter mode. |
| Power Grid Stability Check | Transfer Delay (Sec) = 20 | No Access | Amount of time in seconds the UPS will wait before accepting the AC inpu |
| System ID Number | System ID = Units 8 Digit Serial # | Required | System identification serial number. |
| System Shutdown Enable | Output Shutdown Enable (1/0) = 0 | Required | If enable set = 1, the UPS will shut-down when alarm set points are exceeded. 0 = audible alarm only. |
| Hot Start or AC Start | Hot Start = 1<br>AC Start = 0 | Required | Hot Start - Unit turns on with no AC input power.<br>AC Start - AC power required for unit to turn on. |

## SYSTEM SET POINTS - FACTORY PRESET LEVELS

| Description | Value entered w/ nominal input voltage = 120V | Value entered w/ nominal input voltage = 208V | Value entered w/ nominal input voltage = 240V |
|---|---|---|---|
| Minimum AC Start Voltage | 102 | 177 | 204 |
| Maximum AC Start Voltage | 132 | 229 | 264 |
| Nominal Input Voltage | 120 | 208 | 240 |
| Nominal Output Voltage | Refer to unit Spec tag | Refer to unit Spec tag | Refer to unit Spec tag |
| Low Output Alarm Set points | 105 | 182 | 210 |
| High Output Alarm Set points | 132 | 229 | 264 |
| Low Line Switch Point. NOTE: Fuzzy Logic is entered as shown | Fuzzy Logic = 00. | Fuzzy Logic = 00. | Fuzzy Logic = 00. |
| High Line Switch Point | % = 110 | % = 110 | % = 110 |
| Low Output Frequency Alarm Set Point | 59 | 59 | 59 |
| High Output Frequency Alarm Set Point | 61 | 61 | 61 |
| Low Line Sample Accumulation Set Point | Available (1-2) = 1 | Available (1-2) = 1 | Available (1-2) = 1 |
| Frequency Accumulation Buffer | Available (2-9) = 8 | Available (2-9) = 8 | Available (2-9) = 8 |
| System Shutdown Enable | Audible Only = 0 | Audible Only = 0 | Audible Only = 0 |
| Maximum KVA Rating | Enter actual KVA Rating - See units spec tag | Enter actual KVA Rating - See units spec tag | Enter actual KVA Rating - See units spec tag |
| Hot Start or AC Start | AC Start = 0 | AC Start = 0 | AC Start = 0 |

***** WARNING *****

**CAUTION - RISK OF ELECTRICAL SHOCK.**
**THE UPS RECEIVES POWER FROM MORE THAN ONE SOURCE.**
**BE SURE ALL UTILITY CIRCUIT BREAKERS ARE IN THE OFF POSITION AND THE BATTERY CONNECTOR IS UNPLUGGED BEFORE SERVICING.**

## GENERAL MAINTENANCE

The best preventive maintenance is to operate the UPS in a clean environment with proper ventilation and no restrictions on air intakes and cooling fan outputs.

Battery connections should be tightened annually by qualified electrical personnel. Batteries should be replaced as indicated by battery testing.

The UPS should be checked monthly on battery operation. Take precautions to have the load in a mode that could tolerate a shut down. See *"Maintenance Procedures - Battery Testing"*.

## COMPLETE MAINTENANCE CHECK

**PREPARATION -** A shutdown period must be scheduled to perform maintenance. The loads should be available to test the UPS with a loss of power simulation.

**EQUIPMENT -** Wire brush or other cleaning device (for battery connections), insulated tools (for battery connections) and safety glasses.

### SYSTEM OPERATION

1. With power on, check display functions of unit for proper operation.
2. Turn Input Source and Input AC breaker off.

### VISUAL INSPECTION

1. Open Door.
2. Remove any load from unit's output.
3. Check for burnt, frayed, broken or loose connections. Look closely in the following areas: Input, output connections ,circuit breakers and battery terminals.
4. Correct any loose connections, replace any physically burned or broken components. Use extreme care when replacing components to assure correct installation.

### GENERATOR TEST

1. If generator is backing the UPS, check to be sure the UPS operates properly with the generator.

   A. Check generator operation with no load. Unit should switch to inverter when generator turns on. After a minute or so the UPS should switch back to normal mode and run off the generator.

   B. Check generator with customers loads.

## BATTERY MAINTENANCE - AUTHORIZED PERSONNEL ONLY
## SEE *"SAFETY PRECAUTIONS"*

1. Visually inspect all battery connections,. If there is any sign of corrosion - disconnect that battery and clean with wire brush. Tighten all other battery connections. Make sure batteries are not swollen or cracked. If they are, contact factory.

2. If batteries must be replaced, contact factory or see *"Installation - Battery Installation"* and *"Installation - Battery Wiring"*.

## BATTERY TESTING

**Battery testing should be performed periodically to ensure efficient operation.**

### PREPARATION

Proper precautions must be taken when performing battery testing. The load(s) should be available to test on inverter, in a loss of power simulation. Be sure also to take precautions to have the loads in a mode that could tolerate a shut down. If the battery test fails the system may shutdown and all of the critical loads connected to it will lose power.

It is recommended that batteries are inspected for corroded and lose connections before performing the battery test. Battery connections should be tightened annually by qualified electrical personnel. Standard batteries should be replaced every 5 years or as indicated by monthly battery testing. For more info on battery maintenance, see the "UPS maintenance" section in this manual.

**Annual Battery Test - ( full load run time)**

1. On the front display select battery percentage, be sure that it is 100%. If it is not 100%, allow batteries to charge until it reads 100%.

2. Open front door and turn the AC input breaker off only, unit should run on inverter. Allow batteries to completely discharge. If the batteries do not complete the full load run-time of the unit, they may need to be replaced. Contact factory for service.

| PROBLEM | PROBABLE CAUSE | SOLUTION |
|---|---|---|
| UPS will not turn on. | Enable switch is off. | Turn on. |
| | Internal shipping damage. | Call factory. |
| | Wrong input voltage or no voltage. | Verify input voltage. |
| | Bad battery. | Have batteries tested. |
| | Trips buildings circuit breaker. | Remove other equipment on the same circuit. |
| UPS shuts off. | Overcurrent condition. | Restart UPS by turning Enable Switch OFF and then ON. Monitor % load, if it exceeds 100% reduce output loads. |
| | Bad cooling fan. | Replace cooling fan. |
| | Cooling fan blocked. | Check for proper clearance or for dirt and dust build up. |
| | Room temperature to hot. | Verify operating specs. |
| UPS alarms occasionally. | Normal. | UPS is protecting your equipment from momentary sags and surges. |
| | Intermittent Alarm. | Monitor type of alarm and frequency, take action on particular alarm. |
| UPS switches to batteries more then 3 to 4 times per hour or will not return to utility power. | Chronic input fluctuations. | Have input voltage monitored. |
| | UPS to sensitive. | Turn SW1 position 1 OFF and position 2 ON. |
| No output when utility power fails. | Bad battery connection. | Have batteries tested and connections checked. |
| | Batteries discharged. | Allow batteries to recharge for 6 to 8 hours. |
| Short battery backup time. | Batteries not charged. | Allow batteries to charge 6 to 8 hours. |
| | Unit overload. | Check % load display and reduce load. |
| | Defective battery. | Have batteries tested and connections checked. |
| UPS operates but drops load. | Communication error. | Check interface cables for continuity, test communications signals. |

# WARRANTY

**This Warranty applies only to the original purchaser who must properly register the product within thirty (30) days of receipt.**

**https://controlledpwr.com/customer-support/warranty-registration/**

Controlled Power Company warrants that our products and their components will remain free from defects in material and workmanship for the duration of the respective warranty period* from the date of shipment and agrees to replace, F.O.B. its factory, any parts which fault through defect in material or workmanship during such period. Non payment for the product to either the reseller, rep, distributor or the factory direct will result in revocation of warranty, technical support and service contracts. **Warranty begins from date of shipment unless a factory start-up is purchased, then the warranty begins from date of Start Up or 90 days from ship date; whichever comes first.**

If a Start-Up is purchased with the unit(s) or within 30 days from original ship date, the 1st year warranty is upgraded to include onsite labor and expenses during normal business hours (Monday - Friday, 8AM - 4PM). Start up includes all travel and living expenses. Start up description: Testing all emergency circuitry - Calibration - Inspection - Exercising all circuit breakers - Cooling fan check - Input and output parameter check - Air intake / exhaust check - Re-torque all high current terminals - Input/Output verification - Written report. User training to be done at time of start up (no return visits). Product installation is required to be complete before start up can be scheduled.

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Products:

- UPS Systems (LTN) / 1 Year parts only*, Batteries are warranted with a 1 year full replacement warranty and an optional 4 year (48 month) pro-rate, when enrolled in a customer support plan.

* From original shipment date / Excludes on site labor and expenses unless otherwise noted.

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1. This Warranty shall be effective only if and so long as the system is installed and operated in the manner specified in the manual which accompanied the product, and is operated within the ratings on the nameplate of the system.

2. This Warranty shall be effective provided the purchaser pays the cost of transporting the faulty component(s) to and from Controlled Power Company's factory at the purchaser's own expense, unless the item covered under service contract with Controlled Power Company. There is no cost for installation of the replacement component(s) when done at the factory. Otherwise installation of the replacement component(s) are the responsibility of the purchaser, unless the item is covered under service contract with Controlled Power Company. If after inspection the faulty component has been caused by misuse or abnormal conditions in the judgment of Controlled Power Company, the purchaser will be charged for repairs based on parts and labor required. This Warranty does not cover fuses, light bulbs, and other normally expendable items. Controlled Power Company service personnel are not included in this warranty unless covered by a Controlled Power Company service contract.

3. This Warranty shall be void if any alteration is made to the system, or any of its components are altered by anyone other than an authorized Controlled Power Company service person, without the written permission of Controlled Power Company.

4. This Warranty is in lieu of all other warranties, expressed or implied. Controlled Power Company neither assumes, nor authorizes any person to assume for it, any liability other than that specifically set forth in this Warranty. Except for its obligations, Controlled Power Company assumes no liability or responsibility for personal injury, loss of life, consequential or other damages resulting from defects in, or failure of, the system or any of its components.

**https://controlledpwr.com/customer-support/warranty-registration/**

# Contact Controlled Power Company.

**CONTROLLED POWER COMPANY NATIONWIDE CUSTOMER SUPPORT**

Controlled Power Company offers total customer support that assures your critical equipment is maintained properly for trouble free operation.

**WHAT A CUSTOMER SUPPORT PLAN OFFERS:**

**HOTLINE:** 24 hour toll free 1-800-521-4792.

**REMEDIAL MAINTENANCE :** Covers all on-site repairs, parts, freight, labor and travel expenses.

**RESPONSE:** Immediate 24 hour phone support. If problem is not solved Controlled Power will make every effort to have your system running within 48 hours.

**BATTERIES:** Battery changes, installation, freight, travel and disposal are covered under a 48 month pro-rate schedule when enrolled in a customer support plan, beginning from the original date of shipment or battery installation date. Batteries are not covered if they were not supplied by Controlled Power Company.

**PREVENTIVE MAINTENANCE:** Optional preventive maintenance includes the following:

- Testing all emergency circuitry
- Inspection
- Exercising all circuit breakers
- Input and output parameter check
- Complete battery inspection and testing
- Re-torque all high current terminals
- Calibration
- Clean internal and external
- Cooling fan check
- Air intake / exhaust check
- Written report

**START UP:** Includes installation inspection (wired properly, location, environment), Unit inspection (internal and external), Unit power up, Operation verification including options. One visit, includes all travel expenses.

| PLAN | ON SITE COVERAGE | PARTS COVERED | FIELD REPAIR LABOR COVERED | FACTORY REPAIR LABOR COVERED | FREIGHT COVERED | TRAVEL EXPENSES COVERED |
|---|---|---|---|---|---|---|
| SILVER | NONE | YES | NO | YES | NO | NO |
| GOLD | M-F 8AM-4PM | YES | YES | YES | YES | YES |
| PLATINUM | 24-7 | YES | YES | YES | YES | YES |

**TRAINING AND PARTS**

For Customers who maintain their own equipment, Controlled Power offers hands on training at our training facility and part kits. For more information, contact Controlled Power Customer Support Department at 1-800-521-4792.

Individual components are available upon request, please contact the factory for specific part numbers and prices. When contacting the Parts Department, please have the unit's full model number and serial or system number. Call 1-800-521-4792.